The Shifting of the Property Tax on Urban Renters: Evidence from New York State's Homestead Tax Option

by

David J. Schwegman
American University

John Yinger
Syracuse University

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Abstract

In 1981, New York State enabled their cities to adopt the Homestead Tax Option (HTO), which created a multi-tiered property tax system for rental properties in New York City, Buffalo, and Rochester. The HTO enabled these municipalities to impose a higher property tax rate on rental units in buildings with four or more units, compared to rental units in buildings with three or fewer units. Using restricted-use American Housing Survey data and historical property tax rates from each of these cities, we exploit within-unit across-time variation in property tax rates and rents to estimate the degree to which property taxes are shifted onto renters in the form of higher rents. We find that property owners shift approximately 14 percent of an increase in taxes onto renters. This study is the first to use within-unit across time variation in property taxes and rents to identify this shifting effect. Our estimated effect is measurably smaller than most previous studies, which often found shifting effects of over 60 percent.

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I. Introduction

Policymakers and economists have long been interested in the economic incidence of land and property taxes (England 2016). The property tax is the main source of own revenue for local governments in the United States. Thus, the nature of this incidence has important policy implications. Many empirical studies examine the impact of the property tax on owner-occupied housing. The consensus in the literature is that property taxes are capitalized into home values. All else equal, a higher property tax rate leads to a lower market value (Tsoodle & Turner 2008; Palmon & Smith 1998; Yinger et al. 1988). This result implies that property taxes on owner-occupied housing falls on people who own the property at the time of a property tax increase.

The incidence of the property tax on rental housing has proven to be more difficult to pin down. Renter mobility and the heterogeneity of public services in urban areas make it difficult to determine to what extent the owners of rental housing pay the property tax themselves or are able to pass the tax on to their tenants in the form of higher rents (Orr 1968; Arron 1974; O'Sullivan, Sexton, & Sheffrin 1995; Carroll & Yinger 1994). All previous studies rely on comparing the extent to which rents vary with tax rates using across-jurisdiction variation in property tax rates and rents. Moreover, except for Carroll and Yinger (1994), previous studies do not include a comprehensive vector of housing attributes, and they only use public expenditures as a measure of the quality of local public services. Thus, it is unlikely that these studies are adequately controlling for all factors that may be influencing the cost of rental housing within a given jurisdiction (England 2016).

In this paper, we address these concerns by exploiting within-unit, across-time variation in rents and within-city and year variation in property tax rates imposed on different property classes to identify the degree to which property owners shift increases in the property tax onto

renters. To identify this shifting effect, we exploit a unique feature of the property tax system in New York State – the Homestead Tax Option (HTO). The HTO gives a jurisdiction the option, following a full-market revaluation of all properties, to hold constant the proportion of real property taxes paid by homestead and non-homestead units (Cetrino & Benajmin 2014). Homestead properties include apartment complexes of three or fewer units, whereas non-homestead properties include all other classes of property, including rental-housing stock comprised of four or more units. Thus, the HTO creates two separate classes of rental property – rental units in buildings that contain three or fewer units, and rental units in buildings that contain four or more units.

If a jurisdiction elects to implement the HTO, it sets the proportion of taxes paid by these two classes equal to the proportion that each class paid in the year prior to reassessment. For example, if homestead properties paid 40 percent of real property taxes in the year prior to assessment, then the jurisdiction must set property tax rates to ensure that homestead properties will pay at least 40 percent of all future levies regardless of the change in this classes' taxable value.[1]

This policy generates a break in the property tax rates between apartment complexes that are homestead (fewer than four units) and non-homestead (four or more units). In some cases, the two-tier property tax system established by the HTO resulted in a tax rate for non-homestead rental properties (4 or more units) that was almost twice the tax rate of homestead properties (Wong 1998). This break creates variation in the property tax rates for rental properties within a jurisdiction, which makes it possible for us to identify the degree of property tax shifting.

[1] These shares can be adjusted. However, the three jurisdictions that adopted the HTO in this study have not changed these shares since adoption of the HTO.

Following Carroll and Yinger (1994), we construct a model based on the assumption that rents reflect both an underlying market rent and the property tax payment. From this model, we are able to identify how rents change with respect to changes in the nominal tax rate and identify two parameters—the degree of property tax shifting onto renters and the degree to which changes in the property tax rate show up in assessed values. To estimate this model, we use restricted-use unit-level American Housing Survey data from 1975 to 1994, which will allow us to exploit within-unit variation in rents and property taxes. This strategy enables us to control for time-invariant unit characteristics and neighborhood characteristics that might affect rents.

We find relatively small degrees of shifting of property taxes onto renters. Comparing units in buildings with between 1 and 5 rental units, we find that approximately 14 percent of property taxes are shifted onto renters in the form of higher rents (with a discount rate of 3 percent). Property owners thus bear approximately 86¢ for every $1 increase in the local property tax.

Our theoretical model assumes that assessors follow a strict income method when assessing property. However, we find evidence that assessors deviate from this method, which suggests our theoretical model is incomplete. It is possible that the deviation from the strict income method we observe is driven by lags in the incorporation of rent changes into the assessed value. Given the nature of our data, we inherently have an approximate three-year lag in our dependent variable. However, the incorporation of the assessment into the assessed value may take even longer than three years.

Alternatively, the governments we examine have assessment caps on all rental properties or a subset of rental properties in their jurisdictions. These assessment caps limit the ability of assessors to fully incorporate true rents into the assessed values if the rise in the rents would raise

the assessed value of the property above the assessment cap. Thus, these assessment caps may prevent assessors from applying a strict income method to assess rental properties.

The major contribution of this paper is that we exploit changes in rents and property tax rates within the *same* unit across time. Thus, to the extent that neighborhood characteristics/amenities and the quality of public services does not change rapidly, we are able to effectively control for unobservable service and neighborhood quality. This is the first paper to exploit within-unit, across-time variation in rents and within-city variation in property tax rates to identify the degree of shifting of property taxes onto rental properties in the form of higher rents. All previous studies have used across jurisdictional variation in property tax rates to identify a shifting effect.

Furthermore, compared with previous studies, we do not make any assumptions about the characteristics of renters. Carroll and Yinger (1994) assume that renters are perfectly mobile. Other than this study, the prior literature assumes that renters are not perfectly mobile.

We are also better able to control for observable neighborhood-level and unit-level characteristics by exploiting within-unit changes in rents, as well as within-city variation in the property tax rates. Carroll and Yinger (1994) is also the only previous study to include a comprehensive vector of unit-level controls.

This paper speaks directly to local property tax policy in U.S. cities. Specifically, our paper has implications for assessments of the vertical equity of the property tax. When evaluating the vertical equity of the local property tax, especially when attempting to estimate effective tax rates over the income distribution, previous studies have made somewhat problematic assumptions about the degree to which property taxes are passed onto renters in the form of higher rents. The Institute for Taxation and Economic Policy (ITEP), for example,

assumes that renters and owners of capital bear roughly equal shares of a property tax increase (ITEP 2018). Based on this assumption, ITEP concludes that the property tax is regressive at the lower end of the income distribution, i.e., a disproportionate share of the property tax falls on low-income renters. However, our results suggest that the owners of rental units, who are more likely to be higher-income individuals, bear the majority of a property tax increase. Thus, the property tax is, in fact, more likely to be a proportional tax over the income distribution than previously evaluated.

Our results further inform the current structure of state-funded property relief programs for renters. Nineteen states and Washington, D.C. have programs that provide property tax relief to renters. While these programs vary significantly in structure and design, many of them make explicit assumptions about the extent to which property taxes show up in rents. On average, these programs assume property taxes are approximately 18 percent of rents. Eleven programs assume that property taxes constitute 20 percent or more of rents. We find that, in fact, property taxes are approximately 9 percent of rents. Thus, many state-funded property relief programs for renters provide a pure rent subsidy.

The results of this paper further speak to the debates in the academic literature on whether the property tax is, in fact, a benefit tax. If every additional dollar increase in local property tax corresponds to an improvement in the quality of local public services, then renters benefit from an improvement in amenities without paying the full cost of this quality improvement unless a property owner benefits somehow from this service increase. We find that the property tax on rental housing falls short of being a benefit tax.

II. Literature Review

This paper most directly contributes to a relatively small literature estimating the degree to which changes in the property tax are shifted onto renters in the form of higher rents. The implications of this paper, moreover, speak to the vertical equity of the property tax, as well as to debates regarding whether the property tax is a benefit tax. We address and briefly summarize these literatures below.

Section 2.1: Is the Property Tax Shifted onto Renters?

The first empirical and theoretical study to examine the incidence of the property tax on renters was Orr (1968), who pointed out that the incidence of the property tax on rental housing can be estimated, at least in part, by examining the relationship between property taxes and apartment rents. Orr argued that, if the supply of rental housing capital is somewhat inelastic, then a substantial proportion of the tax on land and real estate improvements may be borne by the property owner and not the tenants. If the supply of housing is elastic within a metropolitan area and there are multiple jurisdictions in a metropolitan area with equally elastic supplies of housing, then a property tax increase is likely to be borne by the property owner and not shifted onto the tenant. However, if renters are less mobile, then the property owner will be able to shift more of an increase in the property tax onto renters.

In his empirical work, Orr (1968) used data for 31 towns and cities in the metropolitan Boston region. Using ordinary least squares, Orr regressed median gross rent for each assessing town on the equalized nominal property tax rate of single-family homes and determinants of supply and demand. He found no evidence of shifting of the property tax onto tenants. As Heinberg and Oates (1970) note, Orr's study, while innovative at the time, jointly estimated supply and demand factors in a single equation rather than in a system of equations. Orr also included a number of controls, including median gross rent divided by the median number of

rooms and fraction of all housing units dilapidated, which are functions of the dependent variable. In a follow-up paper, Orr (1970) used a two-stage least squares model to estimate supply and demand separately. He found that approximately half of the property tax differential on urban rental housing in the metropolitan Boston area was shifted onto tenants.

In the decades following Orr's (1968, 1970) work, scholars developed robust theoretical models that provided some insight into the property tax incidence of urban rental housing. The focus of this research was on property taxation broadly, largely ignoring the extent to which the property tax falls onto renters (Mieszkowski 1972; Aaron 1974; Feldstein 1977). Arnott and MacKinnon (1977) model a closed city in which all residents have identical tastes and income, and in which the city government owns all lands and taxes all property at a uniform rate. They assume that the supply of land in residential use is not perfectly inelastic, and they assume that the supply of rental housing is not perfectly elastic. Using a computable general equilibrium model based on parameters from Toronto, they find that the burden of the property tax heavily falls on tenants. Pasha (1990) descriptively explored how the incidence of a land tax might vary within a metropolitan area and found that at least some of a land rent tax is shifted onto renters.

Despite this theoretical literature, only a handful of studies empirically examine the extent to which the property tax falls onto renters. Hyman and Pasour (1973) used an ordinary least squares model with a limited number of structural and locational controls to estimate the incidence of property tax differentials on rental housing. They find 60 percent of the property tax is shifted onto renters. Dusansky, Ingber, and Karatjas (1981) use cross-sectional data from 62 school districts in New York State to estimate a simultaneous equation model that aims to account for shifting and capitalization. They estimate their model for homeowners and renters

separately. They find that property owners shift 60 percent to 110 percent of the property tax onto tenants.

Carroll and Yinger (1994) note that previous studies assume renters are not fully mobile, suffer from omitted variable bias by failing to include an adequate set of housing attribute controls and measures of public service quality, and do not address the simultaneity in the determination of rents and tax rates. Carroll and Yinger assume that what the rental property owner will pay for an apartment building is equal to the present value of rents minus the present value of property taxes. They also assume that renters consider the cost of rent, as well as the available bundle of public services/amenities, when deciding where to live. After including a city budget constraint, the authors conduct a supply and demand analysis of the community's median rent. The authors find that the extent to which the property tax is shifted onto renters is a function of a community's property tax rate, the cost environment in which public services are produced, and the average residential property value. Then, using across-jurisdiction data on property taxes from the Boston Metropolitan Area in 1980, Carroll and Yinger estimate the impact of property taxes on rents. They find that approximately 10 to 15 percent of the property tax is shifted onto renters.

Tsoodle and Turner (2008) use American Housing Survey data from 14 cities to examine the relationship between proxies of the effective tax rates on rental properties and rents. The authors use effective property tax rates on owner-occupied, single-family homes to proxy for effective tax rates on rental housing, which may not be the case. This study also relies on inter-jurisdictional variation across cities to identify the relationship between rents and property taxes. The authors also assume that renters are childless and do not benefit from better schools

(England, 2016). They find that a one standard deviation increase in the property tax rates increases rents by approximately $450 per year.

In summary, with the exception of Carroll and Yinger (1994), previous studies have found substantial shifting of property taxes onto renters. Most previous studies found that 50 percent or more of a property tax increase is shifted onto renters in the form of higher rents. However, this existing literature has two main limitations. First, most studies use inter-jurisdictional variation to identify the property tax incidence and do not include all possible public service quality and unit-level controls, such as structural characteristics of the unit/building, that may help explain differences in rents across jurisdictions. Second, most studies impose fairly restrictive assumptions about the nature of renters (e.g., Tsoodle & Turner 2008). This paper contributes to this literature by using within-unit variation in property tax rates and rents, which alleviates concerns about omitted variable bias and restrictive assumptions about the role of renters.

Section 2.2: Contributions to the Local Public Finance Literature

The question we ask in this paper can also speak directly to two debates in local public finance. The first debate is about whether the property tax is vertically progressive, regressive, or proportional. The property tax is commonly regarded as regressive (Netzer 1966, pg. 40-42; Oates & Fischel 2016). Most of the evidence on incidence of the property tax by income class is for owner-occupied homes. However, Netzer (1966) notes that that somewhat "less indirect evidence indicates that the tax on rental housing is still more regressive" than owner-occupied residential housing (Netzer 1966, pg. 40).

When estimating the vertical equity of the property tax on renters, all previous work has made certain assumptions about the degree to which landlords shift the property tax onto renters

in the form of higher rents. The Institute of Taxation and Economic Policy (ITEP 2018), for instance, estimates effective tax rates over the income distribution for each major tax system. In their assessment of the vertical equity of the local property tax, the ITEP assumes that "property taxes on rental property are distributed partly to property owners and partly to tenants" (ITEP 2018). In their microsimulations of local property tax systems, the ITEP assumes that renters bear fifty percent of the local property taxes in the form of higher rents. Metcalf (1994) makes a similar assumption when he evaluates the regressivity of state and local tax systems using a lifetime incidence approach.

Based on this assumption, ITEP (2018) finds that non-elderly households who have incomes in the lowest quintile of the income distribution bear a disproportionate share of the property tax. These low-income households have an effective tax rate that is approximately 50 percent higher than households in the second quintile and 40 percent higher than households in the third quintile of the income distribution, respectively. Based on his assumptions, Metcalf (1994) also finds that the property tax is particularly regressive at the bottom end of the income distribution, with the bottom and second quintiles bearing effective tax rates that are over 6 percent and 15 percent more than the top quintile, respectively. Thus, according to these analyses, the property tax is regressive for households in the bottom two quintiles of income. These evaluations find that the property tax is more proportional over the remainder of the income distribution, although the tax generally does become more regressive at the very top of the income distribution (the top one percentile).

However, if renters only bear a relatively small share of any increase in the property tax then the property tax is likely to be less regressive at the lower end of the income distribution than previously assumed. If property owners do not increase rents substantially in response to an

increase in property taxes, then some proportion of the tax burden that previous assessments of the property tax have assigned to low-income households are, in fact, borne, by higher-income owners of rental property.

The second debate is whether or not the property tax is a benefit tax? That is, on average, does the amount that the average resident pays in property taxes roughly pay for that resident's share of local spending? If so, then the property tax can be understood as a "fee" for local public services. The property tax, in this instance, is thus non-distortionary.

As summarized by Oates and Fischel (2016), the benefit view originates with the assumption that there are many different communities that impose different tax rates on property and provide correspondingly different bundles of public services (Tiebout 1956). A key condition of the benefit view is that the communities that levy the property tax must be able to restrict access to the public benefits financed by this tax. The way local governments do this is through zoning (Hamilton 1975; Fischel 2001). Fischel (1992), argues that the property tax is, in fact, a benefit tax and thus merely a fee for local public services. Oates and Fischel (2016) also argue that there is evidence to support the notion that the property tax is a benefit tax in more urbanized, dense housing markets with more inelastic housing supply. If Fischel (1992) and Oates and Fischel (2016) are correct, then the property tax is a non-distortionary tax.

However, Mieszkowski and Zodrow (1989) examine the evidence on whether the local property tax is a non-distortionary benefit tax or a distortionary tax on capital borne primarily by the owners of capital, i.e., the property owners of the rental unit. They reject the notion that zoning is a sufficiently binding process to fully internalize the distortionary effect of the property tax. Carroll and Yinger (1994), specifically examining the case of fully mobile renters, find that renters do not bear the full burden of an increase in the property tax that corresponds with an

increase in public service quality. Thus, both Mieszkowski and Zodrow (1989) and Carroll and Yinger (1994) conclude that the property tax is not a benefit tax.

In order for the property tax to be a benefit tax, renters would need to bear a substantial proportion of an increase in the property tax assuming that the quality of local public services increases as property taxes increase and, consistent with Martinez-Vazquez (1983), that the users of the housing unit (i.e., renters) benefit more from an increase in local public services than the owners of rental housing. If property owners bear a larger share of the local property tax without receiving a correspondingly larger share of local public services, then it suggests that the property tax is distortionary and not a benefit tax.

III. The Homestead Tax Option

To identify within-jurisdiction variation in property tax rates, we exploit a unique feature of the property tax system in New York State, the Homestead Tax Option. In 1975, the New York State Court of Appeals ruled that fractional property tax assessment is unconstitutional. In 1981, in response to this ruling, New York State passed the Homestead Tax Option law, which permitted a dual property tax system.

With out-of-date assessments, residential property is generally under-assessed relative to commercial property. As a result, reassessment leads to an increase in the property tax burden on residential property (Yinger et al., 1988). The HTO gives a jurisdiction the option of preventing this type of increase. To be specific, once a jurisdiction becomes an “approved assessing unit” and undergoes a full revaluation, it can elect to hold constant the proportion of real property taxes paid by homestead and non-homestead units. Homestead properties include one, two, and three-family residential properties, apartment complexes of three or fewer units, farm homes, and mobile homes that are owner-occupied. Non-Homestead properties include all other classes of

property, including rental-housing stock comprised of four or more units and commercial properties (Cetrino and Benajmin, 2014).

If a jurisdiction elects to implement the HTO, it can set the proportion of taxes paid by these two classes to the proportion that each class paid in the year prior to reassessment. For example, if homestead properties only paid 40 percent of real property taxes in the year prior to assessment, then the jurisdiction must set property tax rates to ensure that homestead properties will pay at least 40 percent of all future levies regardless of changes in taxable value (Cetrino and Benajmin, 2014; Wong, 1998).

This policy generates variation in the property tax rates between apartment complexes that are homestead (fewer than four units) or non-homestead (four or more units). This variation creates an opportunity to estimate the property tax shifting onto rental property *within* a city that adopted the HTO. By exploiting this within-unit, across-time variation in rents and property tax rates, we will be able to estimate if, in what manner, and to what degree property owners shift the burden of the property tax onto tenants.

We specifically examine the effect of property tax changes on rents in three cities that adopted the Homestead Tax Option—New York City, Rochester, and Buffalo. New York City adopted the Homestead Tax Option in 1981. The cities of Rochester and Buffalo adopted the HTO in 1985 and 1987, respectively. Using a panel of unit-level data from restricted-use American Housing Surveys from 1975 to 1994, we exploit within-city variation in these three cities over time in rental prices to estimate the incidence of the property tax on renters. New York City, Buffalo, and Rochester are in the American Housing Survey. The Census Bureau surveyed each city multiple times between 1975 and 1994. We describe our specific sample and provide more detail on these data below in Section V.

IV. Empirical Strategy

We begin by assuming that the market rent a consumer faces is the sum of pre-tax rent (R^*), which is a function of housing and neighborhood traits, and the share of the property tax payment (tA) that shows up in rent:

$$R = R^* + \gamma tA \qquad \text{Equation [1]}$$

where t is the nominal property tax rate, A is the assessed value for the property, and γ is the degree of shifting onto rents.

New York City, Buffalo, and Rochester all use the income method when assessing rental property (City of Buffalo 2020; New York City 2019; City of Rochester 2019). With this method, the assessors based their valuation of the property on the discounted flow of rents to the property owners. That is, the assessor draws on observed market rents when calculating assessed value. When rents change, the assessed value changes too, perhaps with a lag. However, it is unclear to what degree this method is employed consistently across metropolitan areas, and whether this method has been consistently used to assess rental properties going back to the mid-1970s. Among the metropolitan areas in our sample, New York City provides the best documentation of their assessment methods across time. NYC has consistently used the income method with rental and commercial property.

The income method for rental property incorporates property taxes into assessed value. This step, however, may be incomplete due to adjustment lapses and perhaps other factors, such as assessment caps. Let β indicate the extent to which the assessor incorporates property taxes into the assessed value (A):

$$A = \frac{R - \beta tA}{i} = \frac{R^* + \gamma tA - \beta tA}{i} \qquad \text{Equation [2]}$$

In equation [2], γ is the degree of property tax shifting onto rents and *i* is the discount rate used by the assessor.

Solving equation [2] for *A* yields the assessor's formula for assessed value:

$$A = \frac{R^*}{i+(\beta-\gamma)t} \qquad \text{Equation [3]}$$

Equations [1] and [3] imply that:

$$R = R^* + \frac{\gamma R^*}{i+(\beta-\gamma)t} = R^*\left(1 + \frac{\gamma t}{(i+(\beta-\gamma)t)^2}\right) = R^*\left(\frac{i+\beta t}{(i+(\beta-\gamma)t)}\right) \qquad \text{Equation [4]}$$

Differentiating equation [4] with respect to the tax rate (*t*) and inverting the result yields:

$$\frac{R}{dR} = \left(\frac{(i+\beta t)(i+(\beta-\gamma)t)}{\gamma i(dt)}\right) = \left(\frac{i}{\gamma}\right)\left(\frac{1}{dt}\right) + \left(\frac{2\beta-\gamma}{\gamma}\right)\left(\frac{t}{dt}\right) + \left(\frac{\beta(\beta-\gamma)}{\gamma i}\right)\left(\frac{t^2}{dt}\right) \qquad \text{Equation [5]}$$

Equation [5] is our primary empirical model. This equation can be estimated using the initial rent prior to the adoption of the homestead (*R*), the change in rent (*dR*), the initial nominal property tax rate (*t*), and the change in the nominal tax rate (*dt*).

While equation [5] has three coefficients, we cannot estimate all three unknown parameters—the discount rate *(i*), the degree to which changes in rents show up in the assessed value (β), and the degree of property tax shifting onto rents (γ). As in the standard property tax capitalization literature, we can only identify the discounted degree of property tax capitalization (β/i) and the discounted degree of property tax shifting (γ/i). Using the estimated parameters from the model above, the parameters of interest can be expressed as:

$$\frac{\gamma}{i} = \frac{1}{\alpha_1} \text{ and } \frac{\beta}{i} = \frac{\alpha_2+1}{2\alpha_1} \qquad \text{Equation [6]}$$

where α_1 corresponds to the estimated coefficient on the first term in equation [5], α_2 corresponds to the coefficient on the second term, and α_3 corresponds to the third term.

The last coefficient in equation [5] also provides a specification test. The results in equation [6] imply that $\alpha_3 = (\alpha_2 + 1)(\alpha_2 - 1)/4\alpha_1$. If this relationship holds, it would provide support for our theoretical framework. This test does not depend on the discount rate. A rejection of this relationship indicates that our framework is incomplete.

We cannot calculate effective tax rates. However, a jurisdiction cannot implement the HTO without first carrying out a reassessment that meets the standards set by the state. In other words, assessed values are close to market values in the year before a jurisdiction implements the HTO. This congruence is likely to persist for at least the first few years after the HTO is in place and may persist indefinitely if revaluations take place at least every four or five years.[2] Thus, we assume that assessed values are close to market values so that, in our sample cities, the nominal tax rate is a close approximation to the effective tax rate.

Another possibility is that, for political reasons, assessors attempt to ease the burden of the higher post-HTO tax rate on non-homestead property by gradually lowering the assessments for this type of property below market value. However, because of the unusual design of the HTO, this type of response appears to be unlikely. To be specific, the HTO requires that the homestead and non-homestead rates be set so that the pre-HTO share of the property tax levy for each class of property is maintained. Lowering the assessment/sales ratio for non-homestead properties would, therefore, require an increase in the nominal rate for non-homestead properties in order to hold constant their share of the property tax levy. As a result, assessors have nothing to gain by systematically lowering the assessment/sales ratios for non-homestead properties.

[2] New York City and Buffalo reassesses property annually. Rochester assesses every four years.

V. Data and Sample

Section 5.1 Rent Data:

The data required for this project come from several sources. Our unit-level rent data is from multiple waves of the American Housing Survey (AHS) from Buffalo, New York City, and Rochester from 1975 to 1994. We use the restricted-use American Housing Survey administrative data. These data were provided to us by the U.S. Census Bureau and the Department of Housing and Urban Development (HUD). The unit of observation in the AHS is a "housing unit," which HUD considers to be any house, townhouse, apartment building, mobile home or trailer, single room, group of rooms, or other location that is occupied as separate living quarters, or if vacant, is intended for occupancy as separate living quarters (AHS 2019).

The AHS includes two different survey samples: the national sample and the independent Metropolitan Statistical Area (MSA) sample. The national survey is conducted every other odd-numbered year, while the MSA survey occurs in selected areas on a rotating basis. We use both the three MSA samples from Buffalo, Rochester, and New York City, as well as the surveyed units from New York City that we observe in the national sample. We do not observe the same unit twice in the national sample for either Buffalo or Rochester.

In Table 1, we list the specific years we observe each city. We observe housing units in Buffalo five times between 1976 and 1994, housing units in New York City seven times between 1976 and 1991, and housing units in Rochester five times between 1975 and 1990. While it appears that we observe housing units in New York City approximately every year, these observations belong to two separate samples (i.e., two separate panels)—the MSA sample and the National Sample. Thus, on average, we observe the average unit approximately every three years.

We use the restricted-use AHS data because the restricted-use files allow us to differentiate between units in particular jurisdictions (i.e., apartments in the cities of Buffalo, New York City, and Rochester) compared to rental units that are in the MSA, but not in these specific cities.

Unfortunately, the restricted-use version AHS data is only available for the survey years going back to 1984. In order to identify rents for units prior to 1984[3], we merged in the public-use AHS files using a crosswalk provided to us by the Department of Housing and Urban Development.[4] We were only able to merge in a limited number of variables—including the unit identification number, metropolitan area identifier, rental variables, and the number of rooms in the building.

To obtain our analytic sample, we begin by only keeping renter-occupied units in New York City, Buffalo, and Rochester that we observe at least twice, i.e. in two separate surveys. We further exclude any observations where the rent does not reflect market rent. This includes units where the rent is stabilized and/or controlled, or where the federal state or local government pays for some cost of the unit, as well as any rental units owned by the government (e.g., public housing units).

Based on publicly available AHS data, these subsidized and rent-controlled units constitute approximately 10 percent of the HTO sample and 21 percent of the non-HTO sample. Please see Table 2 for the descriptive statistics of the HTO sample versus non-HTO sample

[3] It is critical to bring in pre-1984 data because New York City adopted the HTO in 1981 and it is important to include New York City for several reasons. First, New York City provides us with a majority of our sample. Thus, without the New York City observations, we would have likely been underpowered to identify any effects. Second, as noted above, this is a sub-state analysis. Sub-state analyses pose potential disclosure risks. However, New York City is more populated than several states. Thus, the inclusion of New York City reduces disclosure risks.

[4] The restricted-use AHS data can only be used in a restricted computing environment. We used these data at the Cornell Federal Statistical Research Data Center in Ithaca, New York. The Center for Economic Studies and HUD approved the merge between the restricted-use and public-use AHS data.

based on publicly available AHS data from prior to the implementation of the HTO. As seen in Table 2, the average HTO property contains 2.3 rental units, whereas the average non-HTO unit contains 6.2 units. While the market rents are roughly similar between these two types of housing units, the non-HTO sample contains significantly more subsidized units.

Section 5.2 Property Tax Data:

Our property tax rate data are from the New York City Department of Finance, as well as the Property Assessment Offices of Buffalo and Rochester. The New York City Department of Finance provided us with historical nominal property tax rates going back to 1970 for all classes of property. Responding to a Freedom of Information Request, the Buffalo Department of Assessment and Taxation provided us with historical property tax rate information going back to 1973. The Rochester Office of Assessment provided us with historical tax rates for Rochester back until 1975.

As noted below, we examine two different samples. Our primary sample is rental units in buildings with between one and five rental units in their building. We also examine if our estimates are sensitive to the composition of the rental housing by further including units with between six and ten rental units in these buildings. While we cannot report any descriptive statistics on the analytic sample, we use property assessment data from New York City in 2010 and the Decennial Census data from 2010 to examine the tract-level neighborhood characteristics of where these properties are located. We present these summary statistics in Table 3. Based on these data, the neighborhoods where these rental units are located are comparable to the units in our analytic sample in terms of neighborhood demographics, educational background of their

residents, and household income. All summary statistics reported in Table 2 and Table 3 are based on publicly available data, not the analytic sample.[5]

VI. Empirical Model

The current empirical model we estimate and present in this paper is a slightly modified version of equation [5]:

$$\frac{R_{ihct}}{(R_{ihct}-R_{iht-1})} = \alpha_1\left(\frac{1}{(t_{hct}-t_{hct-1})}\right) + \alpha_2\left(\frac{t_{hct}}{(t_{hct}-t_{hct-1})}\right) + \alpha_3\left(\frac{{t_{hct}}^2}{(t_{hct}-t_{hct-1})}\right) + \vartheta_c + \lambda_t + \varepsilon_{ihct} \qquad \text{Equation [7]}$$

The unit of analysis is a surveyed rental unit *i* in property class *h* in city *c* in year *t.* Our dependent variable is the rent observed for unit *i* in year *t* divided by the change in rent for unit *i* observed in survey year *t* from the observed rent for unit *i* in the last observed survey year, which we denote as *t* – 1. The average number of years between AHS surveys for the median unit is approximately three years.

The first parameter is one divided by the change in the nominal tax rate in survey year *t* compared to the change in the nominal tax rate between survey year *t* and survey year *t – 1*. α_1 is thus equal to $\frac{i}{\gamma}$. The second term is the nominal tax rate in survey year *t* divided by the change in the nominal tax rate in survey year *t* compared to the change in the nominal tax rate between survey year *t* and survey year *t – 1*. α_2 is thus equal to $\frac{2\beta-\gamma}{\gamma}$. The third parameter is the square of the nominal tax rate in survey year *t* divided by the change in the nominal tax rate in survey year *t* compared to the change in the nominal tax rate between survey year *t* and survey year *t – 1*. α_3

[5] The output we report in Table 4 has been has been approved by the U.S. Census Bureau's Center for Economic Studies Disclosure Avoidance Office.

is thus equal to $\frac{\beta(\beta-\gamma)}{\gamma i}$. In this current model, we include a city fixed effect (ϑ_c) and year fixed effect (λ_t). ε_{ihct} is an idiosyncratic error term.

Our preferred model is a slightly modification of Equation [7]:

$$\frac{R_{ihct}}{(R_{ihct}-R_{iht-1})} = \alpha_1\left(\frac{1}{(t_{hct}-t_{hct-1})}\right) + \alpha_2\left(\frac{t_{hct}}{(t_{hct}-t_{hct-1})}\right) + \alpha_3\left(\frac{{t_{hct}}^2}{(t_{hct}-t_{hct-1})}\right) + \theta_{ct} + \varepsilon_{ihct} \qquad \text{Equation [8]}$$

This model is the same as equation [7] except that we include a city-year fixed effect (θ_{ct}). With the inclusion of the city-year fixed-effect, our identifying variation is coming from the different tax rates applied to homestead and non-homestead apartment complexes within a given city in a particular year. As of March 2st, 2020, we have run this model and we are waiting for our requested output to be released by the Office of Disclosure Avoidance at the U.S. Census.[6]

VII. Results

In Table 4, we report the estimated coefficients on each of the three terms in equation [6] for two different samples. In Column 1, we report the estimates of equation [7] on housing units that contain between one and five rental units in the apartment complex. Our parameter of interest is the degree of property tax shifting onto renters (γ). Which is the discount rate divided by α_1, or 1 over the change in the property rate. Assuming a discount rate of approximately 3 percent, our results suggest that property owners shifted 13.73 percent (0.03/.2184) of an increase in the property tax onto renters in the form of higher rents. The estimate is statistically significant at the one percent level. While this estimate is consistent with Carroll and Yinger's estimated degree of rent shifting using with MSA variation across a metropolitan area, it is

[6] The request was submitted on February 18th, 2020.

substantially lower than other estimates based on cross-jurisdiction variation (Orr 1970; Hyman and Pasour 1973; Dusansky, Ingber, and Karatjas 1981; Tsoodle and Turner 2008).

In column 2 of Table 4, we include housing units containing between one and ten rental units. Assuming the same discount rate, this estimate suggests that property owners shift approximately 10 percent of an increase in the property tax onto renters in the form of higher rents.

The second parameter of interest from equation [5] is the β term, which reflects the degree to which an assessor changes the assessed value in response to a tax change. Interestingly, β does not equal one. This suggests that assessors deviate from the strict income method when assessing rental property. Assuming a discount rate of three percent, in column one, β is estimated to be 7.3 percent.[7] One may think of this term as the degree of assessor-based property tax capitalization. In column 2, the estimated β is 5.89 percent for the sample that includes apartment buildings with between one and ten rental units. These estimates are statistically significantly different from zero at the one percent level.

It is unclear why exactly an assessor may deviate from the income method. One reason may be that there are assessment caps on all rental properties or a subset of rental properties in our sample. For instance, since 1983, rental housing in buildings containing one to three units in New York City are subject to specific assessment caps. These properties are known as "Class 1" properties. The NYC assessing office cannot increase the assessed value on Class 1 properties by more than six percent in a given year, nor can a Class 1 property's assessed value increase by more than 20 percent in five years. As a result, for Class 1 properties, there is an effective yearly assessment cap of 3.73 percent (IBO 2018). Thus, despite changes in market rents induced by

[7] $\beta = i\left(\frac{\alpha_1+1}{2\alpha_2}\right) = 0.03 * \left(\frac{0.0629+1}{2*0.2184}\right) = 0.073$

property tax changes, these assessment caps may distort the NYC assessing office's ability to properly assess rental units in this type of property class using the strict income method.

Problematically, as shown below in the final row of Table 4, we fail our specification test. We are able to reject the null, across all three samples, that a_3 is equal to $(\alpha_2 + 1)(\alpha_2 - 1)/4\alpha_1$. We speculate that one reason why we are failing our specification test is that we are only measuring the dependent variable approximately every three years for each city. There are thus other changes in rents, including the composition of renters, which are not being picked up despite our metro and year fixed effects.

Our results will be sensitive to the selection of the discount rate. In Table 5, we calculate the estimates of the γ and β terms under different assumptions of the value of the discount rate. For housing units containing between one and five rental units, the estimated degree of property tax shifting ranges from approximately 14 percent, with a 3 percent discount rate, to approximately 27 percent, with a 6 percent discount rate. A 3 percent discount rate is reasonable for most property types including rental property (Yinger et al. 1988). However, one may want to use a higher discount rate, up to 6 percent, for rental properties. This higher discount rate better captures the higher maintenance costs and more rapid depreciation for these properties (Carroll and Yinger 1994). If we assume a 6 percent discount rate, we find that rents increase by approximately 27 ¢ (in the one to five unit sample) and approximately 20 ¢ (in the one to ten unit sample) for every $1 increase in local property taxes.

In summary, we find that renters bear a much smaller proportion of a property tax increase than the existing empirical literature suggests. Under different assumptions and examining different samples, we find that renters bear, on average, less than 20 percent of a property tax increase in the form of higher rents.

VIII. Policy Implications: Property Tax Relief Programs

Nineteen states and Washington, D.C. have government-funded property tax relief programs for renters. In Table 6, we list the twenty-two programs in these twenty different localities. These programs differ in their eligibility (e.g., age, income, etc.), generosity, and design. For example, while all of the programs have some income limit, some programs provide direct payments to renters while others provide income tax credits. When designing their specific program or programs, most states made explicit assumptions about what share of a rental payment constitutes property taxes. On average, among the states that explicitly enumerate a percentage, these property relief programs assume that property taxes constitute 18 percent of rents.

Our strategy enables us to determine this share empirically. To our knowledge, this is the first attempt to derive this share empirically rather than assume this share based on some ad hoc assumptions, or estimate this share based on assumptions about the extent to which property taxes fall on land (and thus the landlord) compared to the building which is assumed to be borne by the renter (see Netzer 1966).

We assume that the renters pay taxes in the form of higher rents. These taxes are equal to the degree of shifting onto rents (γ) times the assessed value (A) times the tax rate *(t)*:

$$T = \gamma t A \qquad \text{Equation [9]}$$

Equation [2] above implies that rent is a function of the assessed value, the discount rate, the tax rate, and the assessor capitalization parameter:

$$A = \frac{R}{i+\beta t} \quad \text{or} \quad \mathrm{R} = \mathrm{A}(i + \beta\mathrm{t}) \qquad \text{Equation [10]}$$

It follows from equations [9] and [10] that taxes as a share of rent can be expressed as:

$$\frac{T}{R} = \frac{\gamma tA}{A(i+\beta t)} = \frac{\gamma t}{(i+\beta t)} \qquad \text{Equation [11]}$$

Based on our estimates of β and γ for rental units with between one and five units and assuming a discount rate of 3 percent and a tax rate of 2 percent, we find that property taxes are approximately 8.7 percent of rent.[8]

We find that even the least generous state-funded programs make too generous assumptions about the extent to which property taxes are a share of rent. These programs may do two things. Generous tax share assumptions may add a pure rent subsidy to property tax relief programs. While lowering rents via rent subsidies may be an important policy goal, it is unlikely to be the policy objective of state-funded property tax relief programs. These programs are designed to reduce tax burdens, not subsidize rental housing.

These tax credits may also increase the rent that renters are willing to pay. Fifteen out of the twenty-two programs provide tax credits (both refundable and non-refundable credits) on state income taxes, and seven programs provide a direct payment to renters. Suppose the tax credit is designed to equal the full tax burden (γtA) and rents increase by ($\delta\gamma tA$), equation [1] and equation [10] yield the following:

$$R = R^* + \frac{\gamma tR}{1+\beta t} + \frac{\delta\gamma tA}{1+\beta t} \rightarrow R = R^*\left(\frac{i+\beta t}{i+(\beta-\gamma(1+\delta))t}\right) \qquad \text{Equation [12]}$$

[8] $\frac{T}{R} = \frac{\gamma t}{(i+\beta t)} = \frac{(0.1374*0.02)}{(0.03+(0.073*0.02))} = 0.0873$

Based on the assumptions above (β = 0.1374, γ = 0.073, t =0.02, i = 0.03) and that the full credit shows up in rents (δ =1), we find that the impact of property taxes on rents ($\frac{R}{R^*-1}$) rises to 19.8 percent.

IX. Discussion and Conclusion

This is the first paper to utilize plausibly exogenous within-unit variation in rents and within-jurisdiction variation in property tax rates to identify the causal impact of the property tax on renters. Consistent with Carroll and Yinger (1994), we find that property taxes are, to a substantial extent, not shifted onto renters in the form of higher rents. This stands in contrast to most previous studies that have found shifting of between 40 and 110 percent (Orr 1970; Hyman and Pasour 1973; Dusansky, Ingber, and Karatjas 1981). Our study improves upon these studies by exploiting within-unit variation in property tax rates and rents, joint with city and year fixed effects, which enable us to better control for housing attributes and the quality of local public services.

Our results further suggest that the property tax is not a benefit tax. Assuming a discount rate of 3 percent, rents only increase by approximately 14¢ for every $1 increase in the local property tax. Assuming that a $1 increase in local spending translates roughly into a $1 increase in the quality of local public services, then renters obtain larger net benefits from local services than property owners who more directly bear the full burden of local spending (Martinez-Vasquez 1983, 1988).

Moreover, based on an assumption that renters and owners of rental units bear a roughly equal share of the local property tax, previous assessments of the vertical equity of the local property tax have found that this tax system is generally regressive at the lowest end of the

income distribution. However, our results suggest that renters bear a relatively lower share of an increase in local property taxes than previously assumed. Renters are more likely to be low-income individuals with average household incomes in the first three deciles of the income distribution (Desmond 2017). If rents increase by approximately 14¢ for every $1 increase in local property taxes, it is likely that some of the property tax burden that ITEP (2018) and Metcalf (1994) have assumed is being borne by the bottom quintile is, in fact, being borne by higher income households. Thus, our result suggest that the property tax is more proportional than previously assumed.

Relatedly, our results specifically speak to debates underway about how to reform the property tax system in New York City. In 2018, Tax Equity Now New York (TENNY) sued New York City over their current property tax system. TENNY argues that the "current system imposes higher effective tax rates on renters and homeowners in less affluent neighborhoods, as compared to the owners of higher value single-family homes, condos [condominiums], and coops [cooperatives]." TENNY specifically posits that inequities in the property tax falls disproportionately on rental housing, which make it difficult to keep housing units affordable (TENNY 2020).

In response to the lawsuit, the New York City Independent Budget Office (IBO) analyzed two different property tax reform scenarios. In their report, they note that large rental properties, i.e. buildings with 11 or more units, faced the highest effective tax rates in the city. They specifically write: "while landlords are responsible for paying the property tax, some portion of the owner's tax bill is indirectly borne by tenants in the form of higher rents. Given that renters in the city generally have lower incomes than owners of houses, coops [cooperatives], or condos [condominiums], it is likely that New York City's residential property taxes fall

disproportionately on renters." (IBO 2018, page 3). Our results suggest that, in reality, property taxes are unlikely to fall disproportionately on renters.

Moreover, under the various tax reform scenarios proposed by New York City and TENNY, the IBO finds that revenue-neutral reforms would reduce the effective tax rate for larger rental properties. The property tax bill for coops, condos, and smaller rental buildings would thus increase (IBO 2018). Contrary to TENNY's assertions, however, this property tax reform is likely to be a financial windfall to the owners of rental capital, rather than rent-reducing for tenants. If property owners do not increase rents in response to increases in the property tax, it is reasonable to assume that they will also not decrease rents in response to decreases in the property tax. Thus, the results of our paper suggest, this reform is unlikely to provide much benefit or rent relief to renters. The proposed reform will cause increases in the property tax to fall disproportionately on homeowners and benefit owners of larger apartment complexes.

X. References

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Table 1: Year in which Specific each MSA is Surveyed

Survey Year	Buffalo	New York City	Rochester
1974			
1975			X^{M}
1976	X^{M}	X^{M}	
1977			
1978			X^{M}
1979	X^{M}	X^{N}	
1980		X^{M}	
1981			
1982			X^{M}
1983		$X^{M, N}$	
1984	X^{M}		
1985			
1986			X^{M}
1987		$X^{M, N}$	
1988	X^{M}		
1989		X^{M}	
1990			X^{M}
1991		$X^{M, N}$	
1992			
1993			
1994	X^{M}		

Notes: Buffalo and Rochester are only MSA Samples. (M) indicates MSA sample. (N) indicates National Sample.

Table 2: Descriptive Statistics from Rental Housing Sample from Buffalo, Rochester, and New York for Pre-HTO Public-Use AHS Surveys from 1975, 1976, 1978 and 1979

	HTO # of Units < 4	Non-HTO # of Units > 4
Average # of Units	2.30 [0.48]	6.22 [1.90]
Average Market Rent ($)	172.44 [117.54]	175.83 [90.60]
% Subsidized by Government or Rent Controlled	0.10 [0.31]	0.21 [0.40]
Number of Observations	1,626	11,030

Table 3: Mean Census-Tract Demographics where Rental Unit Groups are Located in New York City.

	1-3 Rental Unit Buildings	4-10 Rental Unit Buildings
Percent White	60.6%	58.6%
Percent Black	21.2%	23.8%
Percent Hispanic	10.6%	9.4%
Percent Asian	8.1%	8.6%
Percent High School Educated or Higher	68.4%	68.9%
Percent Bachelor's Degree or Higher	39.9%	38.8%
Labor Force Participation Rate	48.9%	50.1%
SNAP Participation Rate	9.7%	9.7%
Average HH Income	$79,533.03	$76,491.82

Notes: Property data is from the 2010 property Assessment Data from the Department of Finance. Geographic identifiers for assessed units were provided by the New York City Department of Public Planning. Census-tract level demographic data are from the 2010 Decennial Census.

Table 4: Incidence and Shifting Equation (Dependent Variable: rent / change in rent)

	Rent / Change in Rent	Rent / Change in Rent
1 / change in tax rate	0.2184	0.3048
	(0.0629)	(0.0651)
tax rate / change in tax rate	0.0629	0.1972
	(0.0715)	(0.0678)
(tax rate squared) / change in tax rate	0.0057	0.0144
	(0.0062)	(0.0059)
Estimated Degree of Shifting (γ)	13.73 percent	9.84 percent
Sample	1-5 Units	1-10 Units
City FE	Y	Y
Year FE	Y	Y
R-Squared	0.0199	0.0082
Obs	2600	3200
Specification Test (See Equation 6)	0.0007	0.0000

Notes: This research was performed at a Federal Statistical Research Data Center under FSRDC Project Number 1959. All results have been reviewed to ensure that no confidential information is disclosed.

Table 5: Estimates of γ and β under different discount rates .

	γ		β	
Discount Rate	1-5 Units	1-10 Units	1-5 Units	1-10 Units
0.03	13.74%	9.84%	7.30%	5.89%
0.04	18.32%	13.12%	9.73%	7.86%
0.05	22.89%	16.40%	12.17%	9.82%
0.06	27.47%	19.69%	14.60%	11.78%

Table 6: Property Tax Relief Programs for Renters

State	Program Name	Assumed Percentage	How is Benefit Disbursed
Arizona	Senior Citizen Property Tax Refund Credit	Landlord Determines %	Credit to the income tax bill
Colorado	Property Tax and Rent Rebate	20% (18% if heat/utilities included)	Direct payment to taxpayer
District of Columbia	Regular Circuit Breaker	20.00%	Credit to the income tax bill
Illinois	Circuit Breaker Tax Grant for Senior Citizens and Disabled	25.00%	Direct payment to taxpayer
Iowa	Elderly and Disabled Homeowner and Renters Property Tax Credit	23.00%	Credit to the property tax bill
Maine	Property Tax Fairness Credit Circuit Breaker	15.00%	Direct payment to taxpayer
Maryland	State Renters' Tax Credit with Local Option	15.00%	Direct payment to taxpayer
Massachusetts	Real Estate Tax Credit for Persons Age 65 and Older	25.00%	Credit to the income tax bill
Michigan	Homestead Property Tax Credit (Circuit Breaker)	23.00%	Credit to the income tax bill
Michigan	Homestead Property Tax for Seniors and Disabled	23.00%	Credit to the income tax bill
Minnesota	Homestead Credit Refund	17.00%	Direct payment to taxpayer
Missouri	Property Tax Credit Claim	20.00%	Credit to the income tax bill
Montana	Elderly Homeowner/Renter Credit	15.00%	Credit to the income tax bill
New Mexico	Property Tax Rebate for Elderly with Local Option	6.00%	Credit to the income tax bill
New York	Real Property Tax Credit for Homeowners and Renters	25.00%	Credit to the income tax bill
New York	Enhanced Real Property Tax Credit - New York City	15.75%	Credit to the income tax bill
Pennsylvania	Rebate and Circuit Breaker for Seniors or Disabled Persons Circuit Breaker (PTRR Program)	20.00%	Direct payment to taxpayer
Rhode Island	Property Tax Relief for Elderly and Disabled	20.00%	Credit to the income tax bill
Utah	Property Tax Circuit Breaker	9.50%	Credit to the property tax bill
Vermont	Homestead and Renter Property Tax Rebate	% of Income by Brackets	Credit to the property tax bill
West Virginia	Tax Relief for Elderly Homeowners and Renters	12.00%	Direct payment to taxpayer
Wisconsin	School Property Tax Credit for Renters and Homeowners	12.00%	Credit to the income tax bill

Source: *Significant Features of the Property Tax* (2015), Lincoln Land Institute.